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FINAL SUMMARY OF FIELD DATA VERIFICATION RESULTS FOR PROPERTIES INSPECTED IN 2007

FOR THE

TROY ASBESTOS PROPERTY EVALUATION PROJECT

Troy Operable Unit Number 7
of the Libby Asbestos Superfund Site

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1.0 INTRODUCTION

The purpose of this report is to present the results of Tetra Tech EM Inc.'s (Tetra Tech) efforts to verify the accuracy and completeness of Troy Asbestos Property Evaluation (TAPE) field documentation collected and recorded during the 2007 field inspection season performed in Troy, Montana. Verification efforts were conducted in accordance with version 1 of the "Data Management Plan for the Troy Asbestos Property Evaluation Project" (Tetra Tech EM Inc. [Tetra Tech] 2008).

1.1 BACKGROUND

TAPE field documentation includes all data compiled and recorded on field forms, on GeoXT handheld computers, and in photographs taken during property assessments conducted during the TAPE. Access agreements, logbook entries, property sketches, and point of contact (POC) forms were scanned to portable document format (PDF) files and, together with digital photographs, were compiled in the electronic data archive. All information entered on the GeoXT handheld computers in the field was downloaded to the Scribe TAPE database (Scribe database).

Verification of field documentation was done to ensure, to the greatest extent possible, that all necessary information was entered completely and accurately into logbooks and handheld computers; that photographs were correctly and adequately cataloged; and that no discrepancies exist amongst these various records as documented in the Scribe database and electronic data archive for each property.

As part of the verification process, resolution of field documentation issues was done to rectify inaccuracies and discrepancies, so that the final record for each property is as accurate and complete as possible. In most cases, resolution required correction of discrepancies by updating the Scribe database or by adding comments to scanned field documents such as logbook entries and property sketches. In some cases, it was necessary to consult with field crews and the Montana DEQ or to conduct follow-up site visits to obtain missing information or rectify discrepancies.

2.0 DESCRIPTION OF VERIFICATION ACTIVITIES

The verification process was two tiered. The tiers are referred to as Category 1 and Category 2 verification. These verification tiers were primarily designed to eliminate incorrect (in particular, false negative) determinations of visible vermiculite (interior and exterior) from the record, as well as to ensure the highest level of accuracy of the information recorded in the Scribe database and electronic data archives.

The scope and steps of Category 1 and Category 2 verification are described in Sections 2.1 and 2.2, respectively.

2.1 CATEGORY 1 VERIFICATION

Category 1 verification was conducted on 100 percent of the data generated during the 2007 TAPE field season. The process involved two general types of queries of the Scribe database; global queries and relational queries. Global queries were conducted first, followed by relational queries.

Global queries were done sequentially, so that the broader-based discrepancies were eliminated first. Example global query topics include: (1) identification of blank fields, (2) identification of missing Troy TAPE (TT) or use area (UA) numbers, and (3) identification of obvious errors, such as the area of a primary residence listed as 50 square feet.

After the global queries were run and identified issues resolved, the relational queries were conducted. Relational queries were also completed on 100 percent of the field data for all properties investigated during the 2007 TAPE field season. Similar to the global query process, relational queries were completed sequentially with discrepancies being resolved before moving on to subsequent queries. Example relational queries include:

- The land use description must correspond appropriately to the land use category. For example, if the land use description is "C - Decorative Gravel/Rock," the land use category should be "Common Use Areas."
- If the value in the database for "DOES THE INTERIOR HAVE VERMICULITE ATTIC INSULATION?" is "*No attic*," then the value in the database for "EXTENT OF FINISHING IN THE ATTIC AREA?" should be "*No attic.*"

The Scribe Database Administrator (database administrator) ran the global and relational queries and designated a TAPE Data Verification Analyst (verification analyst) to resolve any issues found. The analyst documented how to resolve each issue in a modification tracking (ModTrack) form. This form is an Excel spreadsheet that allowed the verification analyst to record and track the necessary changes by identifying specific items requiring resolution and the corresponding modification. The database administrator compiled each of the ModTrack Excel files from the verification analysts into a master ModTrack Access database file as a record of the recorded changes. The database administrator then made the corrections to the database as indicated in the ModTrack forms.

2.2 CATEGORY 2 VERIFICATION

Category 2 verification was completed on 31 percent of the properties inspected during the 2007 TAPE field season. The properties verified were randomly selected from the Scribe database, inclusive of properties reviewed during the Category 1 verification process.

Category 2 verification entailed cross checking data contained in the Scribe database with the various documents contained in the electronic data archives. Category 2 verification required access to the following information sources:

- **Internal TAPE Web Portal.** This contains the verification checklist, which identifies the parcels selected for Category 2 verification, and on which the verification analysts documented verification details (for example, verification dates, issues identified, how issues were resolved).
- **Scribe database.** This contains the most recent TAPE database.
- **Electronic Data Archive.** This contains all of the scanned field documents such as logbook entries, property sketches, digital photographs, and response documentation.
- **TAPE Reports (Access database)**. This displays a verification report for each parcel from the Scribe database.

Upon review and verification of all field information for a given parcel, the verification analyst recorded findings for the parcel on the verification checklist on the internal TAPE web portal. The analyst then recorded any changes to be made to the Scribe database in a ModTrack form

and posted it on the internal TAPE web portal so that the database administrator could make the necessary changes.

Resolution of issues identified through verification sometimes required modifications to the Scribe database and/or the electronic data archives. Modifications to the Scribe database were performed by the database administrator based on the information presented in the ModTrack forms. Modifications to the electronic data archives were done by the verification analyst by adding electronic comments to the affected PDF files such that the original document was not altered, but the modifications were clearly indicated in comments that could be viewed in both the electronic file and on the hard copy printout of the file. Verification analysts made these modifications directly to the associated PDF documents and coordinated updates to the master archive with the Electronic Data Archive Coordinator (data archive coordinator).

The verification team also tracked individual Category 1 and Category 2 errors. These errors were assigned to various groupings. For example, errors that may result in a "clean" (no cleanup required) parcel becoming a "dirty" (cleanup required) parcel were grouped together. Errors were tracked in order to (1) provide an analysis of the percentage of errors, such that the overall percentage of properties being evaluated under Category 2 verification could be adjusted, if necessary, and (2) provide information that could be used to adjust field documentation procedures in the future, if necessary.

3.0 SUMMARY AND FINDINGS

A total of 536 parcels with 3,218 locations (UA and buildings [BD]) were inspected during the 2007 field season. In addition, 3,263 samples were collected from these parcels.

3.1 CATEGORY 1 VERIFICATION

Category 1 verification entailed running a variety of global and relational queries in the Scribe database. In addition to the queries, filters and sorting were used to search for incomplete and/or inaccurate data entries.

The Category 1 verification efforts resulted in a number of formatting and procedural modifications as well as error corrections to the Scribe database. An example of a formatting

modification is where the entry for "HadInteriorAtticInsulation" was changed from "NA" to "NA (if attic currently has VCI)". An example of a procedural modification is a blank field that was modified with an "NA" entry. A total of 263 ModTrack changes were made to the Scribe database as a result of Category 1 verification efforts. A total of 79 parcels, 178 locations, and 40 samples were affected.

Generally, any error requiring modification to a visible-vermiculite (VV) count field was considered to be critical, because of its potential to affect remediation decisions. To identify critical errors, the criteria in Table 2 of the Data Management Plan (DMP) [Tetra Tech 2008] were used to separate critical errors from less critical procedural and formatting errors. Additional verification (for example, more in-depth queries) was performed on locations found to have critical errors.

Table 1 summarizes Category 1 verification results for locations. Table 2 summarizes Category 1 verification results for samples.

TABLE 1: CATEGORY 1 VERIFICATION RESULTS FOR LOCATIONS

Query Type/Name	Number of Parcels [a]	Percent of Total Parcels [b]	Number of Locations [c]	Percent of Total Locations [d]
a_ResultsSoil_LD query for Goldade 05/19/2008	1	0.2	1	0
Check VV_Count	17	3.2	46	1.4
chk_UseAreas_1	1	0.2	2	0.1
data scrubber	2	0.4	7	0.2
GIS coord query	1	0.2	1	0
Location query	1	0.2	1	0
Non-Use Parcel with sample query	3	0.6	3	0.1
Property Report Review	1	0.2	1	0
q_IndoorAtticRelation	30	5.6	45	1.4
q_IndoorAtticRelation 08/08/2007	38	7.1	54	1.7
qVV_Less30_exp	1	0.2	2	0.1
Scribe	1	0.2	1	0
Soil re-sample April 2008	7	1.3	9	0.3
UA Sample Query	1	0.2	1	0
UseArea_Desc Invalid value query	3	0.6	3	0.1
UseAreas_match query	9	1.7	26	0.8
VV Reinspection	1	0.2	1	0

Notes:

a Number of parcels modified as a result of the query

b Percentage of parcels modified as a result of the query. The total parcels are the number of parcels inspected in 2007.

c Number of locations (buildings and use areas) modified as a result of the query.

d Percentage of total locations (buildings and use areas) modified as a result of the query. The total locations are the number of locations associated with parcels inspected in 2007.

TABLE 2: CATEGORY 1 VERIFICATION RESULTS FOR SAMPLES

Query Type/Name	Number of Parcels [a]	Percent of Total Parcels [b]	Number of Samples [c]	Percent of Total Samples [d]
Bug/Error list	1	0.2	1	0
chk_LocationOfIndoorVermiculite	5	0.9	7	0.2
chk_LocationOfIndoorVermiculite_field	5	0.9	11	0.3
DUP ID research	1	0.2	2	0.1
Occupant requested follow-up	1	0.2	2	0.1
Property Report Review	1	0.2	1	0
q_Loc_MultSampleDate2 of 08/20/2007	6	1.1	15	0.5
query for emergency removal criteria blanks	2	0.4	2	0.1
Routine scrubber	1	0.2	1	0
Sample Query Check	1	0.2	2	0.1

Notes:

a Number of parcels modified as a result of the query

b Percentage of parcels modified as a result of the query. The total parcels are the number of parcels inspected in 2007.

c Number of locations (buildings and use areas) modified as a result of the query.

d Percentage of total locations (buildings and use areas) modified as a result of the query. The total locations are the number of locations associated with parcels inspected in 2007.

3.2 CATEGORY 2 VERIFICATION

One hundred and sixty eight parcels representing 31 percent of the parcels inspected in 2007 underwent Category 2 verification.

Tables 3 and 4 present breakdowns of the error counts by field and percent of errors in the verified parcels resulting from the Category 2 verification efforts. Table 3 includes only errors that have the potential to affect whether the location meets current removal criteria; in other words, that could affect remediation decisions. Some of the errors summarized in Table 3 may also be categorized as critical errors. Those critical errors were factored into the critical error percentages as well. Table 4 includes only errors that lack the potential to affect whether the location meets current removal criteria; in other words, that cannot affect remediation decisions.

A total of 313 ModTrack changes were made to the Scribe database as a result of Category 2 verification efforts. A total of 71 parcels, 192 locations, and 59 samples were affected.

In addition to the errors identified in the Scribe database, errors were identified in various documents included in the electronic data archive. Documents, such as property sketches, were modified via electronic notes using Adobe Acrobat software to preserve the original document and display the modification comments. Also, if the electronic data archive was found to be missing electronic documents or photos, the files were located in the Troy field office files, scanned, and added to the electronic data archive.

TABLE 3: CATEGORY 2 VERIFICATION ERRORS THAT MAY AFFECT WHETHER A LOCATION MEETS CURRENT REMOVAL CRITERIA

Error Description Modification	Number of Affected Verified Parcels	Percent of Verified Parcels	Number of Affected Verified Locations	Percent of Verified Locations
Location name	13	8	14	1.3
Use area type (e.g., limited use area to specific use area)	12	7	12	1.1
Visible vermiculite counts	10	6	10	0.9
Currently has vermiculite containing insulation in attic	13	8	13	1.2

TABLE 4: CATEGORY 2 VERIFICATION ERRORS THAT MAY NOT AFFECT WHETHER A LOCATION MEETS CURRENT REMOVAL CRITERIA

Error Description Modification	Number of Affected Verified Parcels	Percent of Verified Parcels	Number of Affected Verified Locations	Percent of Verified Locations
Location of indoor vermiculite (not including attic)	1	0.6	1	0.1
Previously had vermiculite containing insulation in attic	5	3	6	0.5
Building type (e.g., garage, shed)	20	12	20	1.8
Description of visible vermiculite (e.g., expanded, unexpanded)	15	9	15	1.4

3.3 HIGH-PROFILE ERROR VERIFICATION

During verification of the 2007 TAPE field data, 5 properties that have VV but were not identified as such in the Scribe database were discovered. In most cases, the VV was described in the logbook and/or shown in photos but not noted in the Scribe database. These high-profile errors were identified during Category 2 verification activities. The errors are summarized in Table 5.

TABLE 5: HIGH-PROFILE ERRORS

Property Identification	Location	Sample Number	Remarks
AD-200594	BD-200412	NA	Photos of VV in attic, but no record of VV in Scribe database.
AD-200700	BD-200693	Not sampled	VV in greenhouse noted in logbook, but no record of VV in Scribe database.
AD-200880	UA-200840	Not sampled	Logbook noted VV in debris pile in non-use area thus was not noted in Scribe; area should have been described as limited use area and sampled, then VV would have been documented in Scribe.
AD-201102	BD-201227	NA	Logbook notes VV in attic, but no record of VV in Scribe database.
AD-201154	BD-201289	NA	Logbook notes VV in attic, but no record of VV in Scribe database.

Notes:
NA Not applicable
VV Visible vermiculite

4.0 RECOMMENDATIONS

The primary objective of field data verification was to ensure the accuracy and completeness of the field data in the Scribe database and in the electronic data archive. In addition, as errors were identified, data collection and management protocol changes were developed to ensure better accuracy for the subsequent field inspection data.

These protocol changes will be included in version 2 of the DMP; expected in 2009. Examples of protocol changes that came about as a result of field data verification are shown below.

- Incorporate interior soil sample VV counts (low, intermediate, high, and not observed) into the field handheld computer

- Maintain data integrity by instituting additional relationship rules to field handheld computer; examples include the following: 1) If 'Was the building remodeled?' equals NO, then both 'When remodeled' and 'Where remodeled' will equal N/A, 2) If 'Heating source' equals NONE, then 'Heat distribution' equals NONE

- Perform additional quality assurance and quality control procedures at the end of each field day including daily overview of logbook entries, sketches, point of contact forms, and photographs. In addition, the number of properties, locations, and samples loaded into the database are verified against the field generated Sample Storage Summary Form

- Add additional values to lookup lists on field handheld computer; lookup lists include 'Sample Variation' and 'Dust Sample Collected?'

- Improve field form entry protocol on handheld computer; examples include improvement of user interface, calculation of dust sample area, and error checking during the save process

A summary of TAPE verifications statistics for 2007 is shown below:

2007 TAPE Verifications Statistics

2007 Total TAPE Inspections: 536
2007 Full Verifications: 168
2007 Properties Verified where VV was completely missed (Labeled High Priority): 4
2007 Percentage of Properties with High Priority Errors (4 out of 168): 2.4%
2007 Potential Number of Properties with High Priority Errors (2.4% * 536 Properties): 13 Properties

2007 Cost of Verifications:

Assume an average of 1 hour per property at an average labor cost of $100/hour, the 2007 property verifications equal $16,800 for 168 properties.

There are 368 properties remaining for 2007, this would equal approximately $36,800 to complete 100 percent verification of all 536 properties inspected in 2007.

5.0 REFERENCE

Tetra Tech EM Inc. (Tetra Tech) 2008. "Final Data Management Plan for the Troy Asbestos Property Evaluation Project." March.

APPENDIX

TABLE 2: CRITICAL FIELD DATA ERRORS
GUIDELINES FOR CATEGORY 2 VERIFICATION

PDA Form	Error Item	Table Name	Field Name(s)	Number of Potential Errors
Parcel Inspection	------			0
Primary Building	Has attic VCI	Location	HasInteriorAtticInsulation	1
	Ever had attic VCI	Location	HadInteriorAtticInsulation	1
	Purchase VCI	Location	VermiculitePurchasedAtStore	1
	VCI used in home	Location	VermiculiteUsedAroundHome	1
	VCI additives	Location	VermiculiteAdditives	1
	Building number	Location	Location	1
Secondary Building	Has attic VCI	Location	HasInteriorAtticInsulation	1
	Ever had attic VCI	Location	HadInteriorAtticInsulation	1
	Building number	Location	Location	1
Use Area	Land use area category	Location	LocationZone	1
	Land use area description	Location	LocationDescription	1
	Visible vermiculite (VV)	Location	VV_High; VV_Intermediate; VV_Low; VV_None [a]	1
	VV description	Location	VV_Desc	1
	Use area number	Location	Location	1
Sample (Dust and Soil)	QC type	Samples	SampleType	1
	Matrix	Samples	Matrix	1
	Sample ID	Samples	Samp_No	1
Dust Sample	VV in interior living space	SamplesAir	LocationOfIndoorVermiculite	1
				18

[a] VV is determined from 3 fields; any value in VV_High, VV_Intermediate, or VV_Low. Any errors associated with VV will only be counted as one error, even though there might be multiple entries in the associated ModTrack form.